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QUARTERLY
INSTITUTE OF AGRICULTURE
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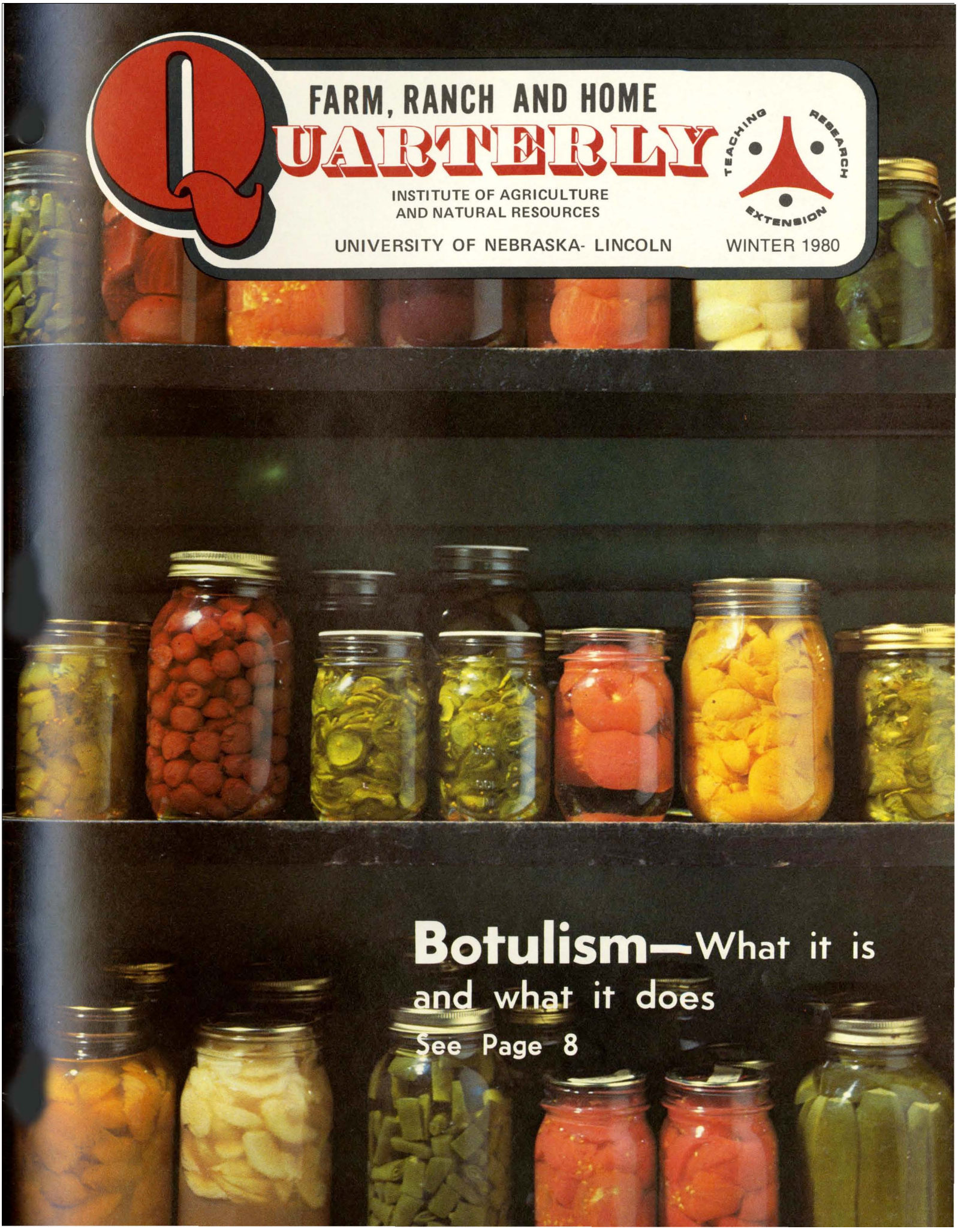
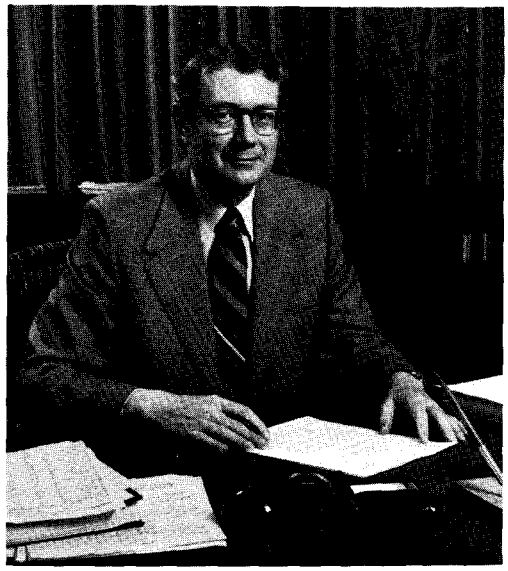
UNIVERSITY OF NEBRASKA- LINCOLN
TEACHING RESEARCH EXTENSION
WINTER 1980



Botulism—What it is and what it does

See Page 8



M. A. Massengale
Vice Chancellor

Market Center Proposed

The citizens of Nebraska have a relatively large stake in the further development of agricultural marketing on the international level.

In recent years, the products from about one of every three Nebraska acres have been exported. That's slightly higher than the national average of one out of every four.

United States exports of wheat, feed grains, and soybeans reached the 4 billion bushel mark in 1978, and current predictions are that exports of those products could reach 5.5 billion bushels in just five years.

Increased exports of those products, along with livestock products, can benefit Nebraska in a number of ways. Increased exports can increase on-farm prices. Statistics show, for instance, that from 1971 to 1976 the farm price of corn increased 8 cents per bushel for every 40 million bushel increase in exports.

Agricultural exports have also been, in recent times, a bright spot in our nation's balance of payments. Nebraska products have gone a long way to help pay for necessary imports such as petroleum.

Increased exports also provide additional jobs off the farm, particularly in the areas of marketing and transportation. Each billion dollars of export sales provides about 53,000 jobs. That means that in each of recent years, ag exports have added 1 million non-farming jobs.

While prospects are bright for increasing agricultural exports, the transportation, storage, selling and financing of agricultural products in international trade represents a complex system.

Farmers, policy makers, agricultural leaders and others need to learn more about marketing systems and marketing alternatives.

In an effort to supply the needed information and training, IANR has included in its 1980-81 budget request funding to initiate the development of a Center for Agricultural Marketing within our Agricultural Economics Department.

Building upon the existing resources in the department, initiation of the Center would require the addition of two faculty members—one in international marketing and one in transportation.

These specialists would conduct education and research programs to help Nebraska producers with information about financing, transportation costs, information systems, tariffs, quotas, and other aspects of marketing Nebraska's farm products world-wide.

Marketing strategies can make the difference between a profit or a loss for agricultural producers and for the entire Nebraska economy. We believe this program will pay high dividends for Nebraska's investment.

On the cover:

Botulism is a constant concern, especially in home-canned foods. The causes, concerns and preventative measures of botulism are detailed in a story beginning on page 8. (Photo by Dick Dodds; canned goods courtesy Mr. and Mrs. Henry Frank, Lincoln)

EDITOR ..... **Terry Meisenbach**
Artist ..... **Eloise Wilson**

Farm, Ranch and Home

QUARTERLY

Winter 1980 **Vol. 26, No. 4**

In this issue:

Founder!

Researchers Seek Baseline Information

Measurement of several physiological functions at one time is possible with the Beckman R611 Polygraph.

By James Amend, Susan Moos, Christine Ross, and Don Cain, Jr.

Few conditions capture the attention of horse owners quite like "founder", more correctly known as *equine laminitis*. This disease, often the result of accidental overfeeding with grain, usually results in such severe damage to the feet of the horse that the animal is lost to further practical use. In spite of continued investigation by animal scientists and veterinarians, there is currently no completely satisfactory treatment for founder. As in many disease situations of similar complexity, the management of founder suffers from incomplete knowledge of the basic mechanisms involved in its development.

Recognizing the need for more of what scientists call "baseline" information, investigators in the Department of Veterinary Science of the Institute of Agriculture and Natural Resources have initiated new studies on the development of founder. The goal of these studies is a more accurate description of specific changes which lead to breakdown of the equine foot. (In the jargon of this kind of research, this is a description of "Pathophysiology", or abnormality in function.)

Horseowners and veterinarians have known for many years that laminitis involves a loss of function in the layers of tissue which hold the wall of the hoof to the bone structures within it. There are multiple, interlocked layers of this fragile tissue between the inner hoof wall and the "coffin" bone to which the hoof wall is attached. This layered, or "laminated" structure is the reason for the name laminitis, which means inflammation of these tissue layers, or "laminae". Currently, a number of investigators feel that damage to, or death of the laminae is a result of insufficient blood supply, and that "pathogenesis" (development of the abnormal function) of the disease is related to changes in blood supply to the feet of the foundered horse.

The availability of devices capable of measuring blood pressure in large animals has made it possible for researchers to monitor blood pressure in foundered horses. During the acute stage, blood pressure is very high, partially because of the pain, and partially because of other adaptations in the circulatory system. Those who have experienced a case of founder in their own horse may have noted the pounding pulse in the lower forelimb; this is typical of the acutely foundered horse, and is an effect of the high blood pressure.

It seems strange that high blood pressure would be associated with poor blood supply to the foot, but this seems to be the case. One of the goals of the current study is to determine why this is true. To answer a question like this, physiologists in the Department of Veterinary Science are applying a number of specialized instruments to the examination of the circulation of the feet in small ponies. These devices create little or no discomfort for the pony, so the measurements obtained describe normal, undisturbed function. In this way, blood pressure, blood flow, and other determinations may be made in normal animals, and also in animals with experimental laminitis. Once the changes in circulation are understood, it will be possible to begin development of treatments which are designed to protect the blood flow to the feet. Certain drugs may be selected which properly control blood pressure, and improve blood flow in the small vessels of the laminae.

As in all research, investigators are eager to utilize all resources and information available to help solve problems. A wealth of experience

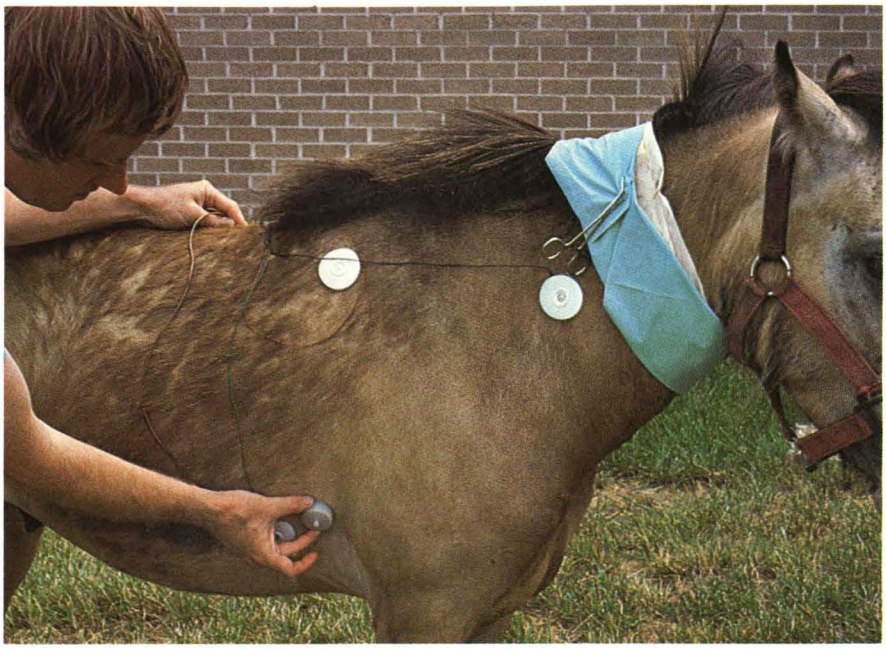
(Continued on next page)

Founder . . .

with founder exists among horsemen, veterinarians, and animal scientists. Communications with individuals from all of these groups can help support the research effort now underway. Focusing on "pathophysiology" of founder, with new instruments, careful investigation, and a large dose of practical experience, can lead to new information, and more successful management of the most feared equine disease.□

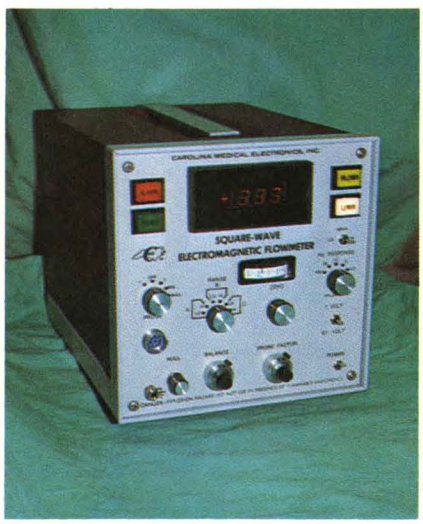
DR. JAMES AMEND is associate professor of veterinary science, SUSAN MOOS and CHRISTINE ROSS have been, respectively, departmental teaching and research assistants, DON CAIN is an undergraduate student in the pre-veterinary curriculum.

The investigators appreciatively acknowledge financial support of the Nebraska-South Dakota Division of The Horseman's Benevolent and Protective Association.



Electrocardiogram (white disks) and heart sounds (hand-held microphone) may be recorded without disturbing the pony.

Blood pressure may be indirectly measured from the tail of the pony using Arteriosonde 1020, an ultrasound device.



Blood flow may be obtained using the electromagnetic flow meter and a surgically implanted flow probe.

Research Digest

Scour Vaccine

Use of the *reo* and *corona* scour vaccine in the pregnant cow has been approved by the Veterinary Biological Division of the U.S. Department of Agriculture.

University of Nebraska Institute of Agriculture and Natural Resources veterinarians at Lincoln and North Platte teamed up with personnel from Norden Laboratories, Lincoln, to develop and field test the vaccine with cooperating ranchers and practitioners before submitting it to the USDA for approval. Norden Laboratories has received registration to produce the vaccine which will be marketed under the name *CALF GUARD®*.

The vaccine will be given approximately 30 days before calving and a second injection just ahead of calving the first year. The second year, the cow should receive one booster injection just ahead of calving. In herds where calving extends 90 days or more, a third injection midway through calving is recommended for the cows that haven't calved.

The principle of this program is to produce a high colostral antibody level to the reo and corona virus at calving time. The sooner the calf nurses, the more antibodies the calf receives.

We have vaccinated over 400,000 cows in field trials in the sandhill area. The vaccine has proven safe in the pregnant cow and provides good protection against calf scours due to the reo and corona viruses.

This vaccine is not a cure-all for calf scours, but it is effective against infection caused by the reo and corona viruses. The use of the vaccine in your herd should be discussed with your veterinarian for next year's calving season.

Corn Lethal Necrosis

A new corn disease called "Corn Lethal Necrosis" is receiving attention by Dr. Ben Doupnik, extension plant pathologist at the South Central Station at Clay Center.

Several variety test plots are located in Franklin and Harlan counties where observation on resistance and cultural practices affecting the disease are being studied. This disease has the potential of 100 percent loss in severely affected fields, thus, finding ways to control or avoid this disease has the potential of having a significant economic effect upon Nebraska and Kansas farmers.

Soil Fertility Study

Soil fertility investigations related to corn, sorghum, wheat and soybeans grown in southeast Nebraska are being conducted by Edwin Penas, associate professor of agronomy.

These studies, conducted at the Southeast Extension and Research Center, will involve the application of multiple rates of nitrogen or phosphorus or the combination of rate of both on different soils for various crops. Soil nutrient delivery capability will be evaluated with soil tests. The influence of lime on the response of the various crops to nitrogen and/or phosphorus will also be evaluated on those soils which are very acid.

Efficient fertilizer programs involve placement methods, time of application, application techniques and nutrient carriers. Studies will be conducted on responsive soils to determine the efficiencies of different fertilizer placements of phosphorus, time of application of nitrogen, methods of applying nitrogen and/or phosphorus and carriers of nitrogen and phosphorus. This information can serve as a guide to develop the most efficient fertilizer program.

A Moroccan peasant farmer mixing broadcast barley seed into rocky soil. Annual rainfall of the area is ten inches.

'Technical Assistance' is Key In Food Production Development

By D. G. Hanway

The people of Nebraska, with those of other states throughout the nation, have a renewed opportunity to help hundreds of millions of people in developing countries to reduce hunger by improving their ability in food production. The primary focus will be on helping peasant farmers, on tiny farms with primitive methods, across Asia, Africa, Central and South America. This will be accomplished by providing *technical assistance,* not by giving them food.

This renewed opportunity is provided by the 1975 Title XII ammendment to the Foreign Assistance Act of 1961 which recognizes the resources that U.S. land grant universities represent in the development and application of agricultural science and technology. No other nation has a comparable concentration of agricultural scientists, agencies and organizations for offering selective, pertinent, and comprehensive assistance for improving agriculture in these countries. Their record of performance in applying science and technology to problems of agricultural production cannot be matched. The land grant system of universities along with the U.S. Department of Agriculture has given this country the most productive agriculture in the world.

Title XII Purpose

The purpose of the Title XII amendment is to help land grant institutions and other universities with agricultural programs to develop and manage their capabilities to help improve agriculture in individual developing nations. Recognizing the importance of institutional expertise and commitment involved, Title XII established a Board of International Food and Agricultural Development (BIFAD) which has members from land grant and other "agricultural" institutions and the private sector, to develop policies and procedures to guide implementation of this program by the Agency of International Development (AID). Also, recognizing that land grant universities need funding to permit this addition, Congress, in 1979, has provided money to AID for Strengthening Grants to participating universities so that development of international capability can be accomplished without reducing existing teaching, research and extension programs.

Shortly after he assumed the position of Vice Chancellor of IANR, Dr. Martin A. Massengale developed a proposal to establish a Division of International Programs in the Institute of Agriculture and Natural Resources. The Board of Regents approved this move, along with the appointment of Dr. Robert W. Kleis to be Dean and Director. The University of Nebraska was one of the first institutions to receive a Strengthening Grant from AID. The title of the Strengthening Grant proposal, "Food Production Systems for Marginal Rainfall Areas," represents the focus that will be given in developing Nebraska's capabilities and the kind of technical assistance opportunities it seeks. Certainly IANR's program and staff capabilities in this area rank with the best in the nation.

Technical Assistance

What is meant by *technical assistance* in agriculture and food production? Is there a need? What approaches are open to us that can be effective?

Technical assistance will include activities that will help the farmers in developing countries increase their production of livestock and crops needed for food. The Title XII legislation emphasizes helping peasant farmers, recognizing that this group represents the "poorest of the poor" among the world's four billion people. Hundreds of millions of these people live in semi-arid regions of Asia, Africa and Central and South America. These include areas where the world's rate of population growth is highest, where many of the 2 billion that will be added to the world's population in the next 25 years will live or starve. Many of these are now food importing nations, not producing enough for their

own people and in many, widespread hunger is common. This becomes starvation when recurring periods of drought cause crop failure, as was prevalent across the Sahel area (the zone on the southern edge of the Sahara Desert) and Ethiopia in recent years.

The general situation among these peoples is poverty, illiteracy from lack of schools and educational opportunities, and a life of subsistence, eating the barley, millet, sorghum or wheat produced with primitive methods on their little plots of land. Many experienced the involvement of colonial powers who occupied their lands. Some were nomadic or semi-nomadic a couple of generations ago, but population increase has forced them to settle. Many retain their livestock culture, in which livestock numbers is a visible measure of wealth and status. As people have increased, they have even been forced to till poorer and less productive lands to produce cereals to eat. Livestock pressure has destroyed productive range and denuded the landscape. Forests and shrubs were destroyed to provide fuel for cooking and when wood is gone, people dry cattle dung to use as fuel to bake their bread. Wind and water each year have greater erosive effects, and productivity of the land is deteriorating rapidly, when greater production is critical.

These people are not lazy. In general, they work extremely hard with their few primitive tools just to stay alive. While they have been denied the opportunity for education, they have had to be perceptive and intelligent just to survive. They are people with honor and dignity within their culture.

Many in Nebraska remember the drought and dust storms of the "Dirty Thirties." They know that farming practices that tilled this land and left millions of acres of it bare were largely responsible. Overgrazing in Nebraska's Sandhills produced blowouts and widespread erosion. Nebraska scientists have been leaders in developing stubble mulching, ecofallow, and till-plant systems to let us protect the land, while saving more of the rain that falls so we can have a bigger and more certain harvest. We learned that overgrazed grass has few roots under it and can neither produce much or even protect the land, but grazing systems have been developed that expanded the livestock populations that can be fed.

The vision of Nebraska's involvement in Title XII is to help protect semi-arid lands from deterioration. We know that the principles we have learned can be widely and effectively applied if the governments of these nations will make the commitment to establish and support the necessary programs to reach peasant farmers. Such undertakings are neither easy nor short range, but where countries are ready to make the commitment, moving promptly is imperative because the needs are urgent.

An Effective Program

Just as the United States can't feed all these people, so we can't give them a program. Any effective program *must be theirs* and we can only help. Thus, their first commitment must be some of the nation's best trained manpower in agriculture. Many of these nations have very few people trained in agriculture to draw on, but they must commit some for graduate training in our programs so they learn how to conduct good field research, how to carry out demonstrations, how to organize and work out training programs with the peasant farmers. All involved must keep in mind that the final measure of success is greater productivity and a better life for the rural peasants. Along with this must come protection and improvement of the land resource and more food for the nation.

As soon as participants have adequate training, they will return to their home country and, with advisers we supply, work with their governments to set up the necessary programs, develop facilities, acquire equipment, and train technicians and workers. The problems of getting continuing budgets to support such developmental efforts are major. Like the people, the governments are also poor, often inadequately staffed with competent people. If the commitment to building their own program to serve their own people on a continuing basis is there, then we can help.

Land grant institutions have developed extensive cooperative programs in research and extension. Drawing on this experience, Iowa State University, Kansas State University and the Universities of Missouri and Nebraska have formed the Mid-America International Agriculture Consortium (MIAC) for the purpose of sharing staff and resources in carrying out technical assistance contracts. The first MIAC technical assistance contract is with the government of Tunisia in North Africa. The second being negotiated is for a program in Morocco, also in North Africa. Each contract is for five years and may be extended. Both relate to helping improve crop and livestock production in their semi-arid regions.

The consortium also has sent teams to Syria and Sri Lanka (formerly known as Ceylon) that could also result in a longer term contract for technical assistance.

Nebraskans have responded generously through the years in trying to help the poor, underprivileged people around the world. Sons and daughters have been in the Peace Corps or missionaries, and contributions through CARE and other similar programs have been extensive. These efforts have all been helpful, but mostly very small in long term, widespread impact.

Today the world has critical needs to expand food production and protect agricultural land resources while programs to control population have time to work. The International Programs Division of the University of Nebraska in the Title XII program of AID is a resource for addressing these needs that can have a major impact on the welfare of hundreds of millions—even billions—of people in the future. Understanding the significance of this mission, Nebraskans can be proud and supportive of their University in making this renewed effort highly successful.□

D. G. HANWAY is professor, agronomy for the Institute of Agriculture and Natural Resources.

Botulism: A Big Problem in a Small Package

By Stan Wallen

Botulism. The name is given to a type of poisoning caused by a microorganism often found naturally in many foods, but more often this name is used to describe a type of poisoning closely associated with home canning. In many cases, the results of botulism poisoning are tragic.

Botulism poisoning is caused by the microorganism *Clostridium botulinum* (C. botulinum). This organism is distributed in terrestial and marine environments throughout the world. C. botulinum produces highly heat resistant spores that are difficult to destroy during canning. Spores in themselves are not dangerous, however if not destroyed, they may germinate, grow and produce a deadly toxin.

There are several types of botulism, although foodborne botulism is the most commonly reported type. It is an intoxication caused by ingestion of toxin in contaminated food.

Infant botulism, first recognized in 1976, is caused by absorption of toxin produced within the intestinal tract of an infant. As of December 1978, 21 states have reported a total of 98 cases. Honey has been implicated as the cause of C. botulinum in several cases of infant botulism. Thus, it is recommended that honey not be fed to infants less than one year of age.

Wound botulism, the rarest form, results from production of toxin in an infected wound. The first reported case of wound botulism occurred in 1943 and since then a total of 18 cases have been reported in the United States.

The toxins produced by C. botulinum are the most deadly known to man. Scientists estimated that one cupful (8 ounces, 224 grams) of this purified poison would kill all the people on earth. Yet botulism is rare. The total number of botulism deaths that occur annually, in all countries, is exceeded by the fatal casualties from auto accidents on any holiday weekend in the United States.

History and Occurrence

Botulism probably accounted for the deaths of many of our ancestors although it was not until 1793 that a well recorded outbreak of "sausage poisoning" occurred in Germany.

The discovery that bacteria caused botulism did not occur until 1896, more than 100 years after the original outbreak of poisoning.

In recent times, meat products, such as sausages, have rarely been associated with outbreaks of botulism. In fact, only about 5 percent of the recorded outbreaks in the U.S. have been associated with meat.

Botulism was first recognized in the United States in 1899. In the 79

years from 1899 to 1978, there were 778 outbreaks of botulism in the U.S. involving 2,019 individuals of which 1,002 died for a mortality rate of 50 percent.

The fatality rate has declined significantly in recent years. The case fatality rate in 1978 of 5.2 percent was a modern low.

The decline in the case-fatality ratio of foodborne botulism from the 60-70 percent figure seen in the first 50 years of this century to the 5.2 percent figure seen in 1978 is due mainly to improved detection methods, more readily available antitoxin, and especially, mechanized ventilatory assistance.

Botulism remains a modern day problem. In 1978, twleve outbreaks of foodborne botulism involving 58 cases, occurred in the United States. This compares with 80 cases in 1977 and an average of 7.9 outbreaks, with 18.7 cases per year from 1970 through 1976.

Signs and Symptoms

Foodborne botulism is almost always caused by eating improperly preserved food in which C. botulinum has grown. Reports of botulism deaths from eating a single string bean or a few kernels of home-canned corn are not uncommon.

One of the most notable outbreaks of botulism in the U.S. killed an entire family of 12. The outbreak involved home-canned string beans.

Whatever food is responsible, the pattern of the disease is generally the same. After ingestion, the toxin is absorbed and carried by the blood to the nerves. Nausea and vomiting are often (56 percent of U.S. cases) the first symptoms to appear. These particular symptoms are probably caused by contaminants other than the botulinal toxin.

Early signs are a tired or weak feeling and dizziness. Double vision, inability to focus, and progressive difficulty in speaking and swallowing almost always occur and are due to the effect of the toxin on nerve transmission.

Individual resistance to the toxin varies widely. Symptoms ordinarily appear in 18 to 36 hours, although in one instance it was as short as two hours. There are also cases on record in which the latent period was as long as a week. Variability in the time of onset from eating contaminated food can be accounted for by the dose and time required for absorption of the toxin.

As the disease progresses, there is an increasing paralysis due to the action of the toxin in preventing the passage of stimuli from the motor nerves to the muscles. Eventually, muscles fail to respond to their specific stimuli until the muscles needed for breathing or the cardiac muscles of the heart falter and fail in their essential contractions.

Because botulism is a rare disease, most physicians probably do not see a case of botulism in a lifetime of practice. This often results in misdiagnosis. The Center for Disease Control (CDC), Atlanta, Georgia 30333, distributes to physicians and other interested individuals information about the use and availability of botulinum antitoxin (at no cost) in an effort to aid in early diagnosis and treatment.

Prompt diagnosis and early treatment of botulism are essential to minimize the otherwise great risk of death due to botulism. When a diagnosis of botulism is considered, the physician should contact the CDC. Equally important is the need to identify the offending, contaminated food source and remove it so others won't partake of it and fall ill; and to test it for toxin. Epidemiologic investigation and disease control are statutorily the responsibility of the local health department, where one exists, and, where not, that of the State Department of Health.

Causes and Concerns

The major cause of botulism outbreaks is improperly processed home-canned food products, which caused 72 percent of the outbreaks in the 79-year period from 1899 to 1978. Less than nine percent were attributed to commercially processed or canned food and the majority of these, 41 of 66, occurred before 1930. The types of food products involved in these outbreaks are listed in Table 1. The type of food processing responsible for 17 percent of the outbreaks is unknown.

Ten outbreaks of botulism have been recorded in Nebraska; 28 cases and 21 fatalities. The most recent outbreak occurred in 1979.

Vegetables are the major type of food involved in botulism outbreaks. Of the outbreaks shown in the table, 151 (54 percent) were associated with vegetables. Fish was second with 41 outbreaks, followed by fruits, condiments, beef, milk, pork and poultry. In almost every instance, the foods involved had been canned or processed in some man-

(Continued on next page)

Examples of three commercially canned products with botulism present show bulging or moveable can ends.

Table 1. Food Products Causing Botulism Outbreaks 1899-1977[a]

Product	Outbreaks	
	No.	Percent
Vegetables	151	54.3
Fish and Fish Products	41	14.7
Fruits	29	10.4
Condiments[b]	23	8.3
Beef	8	2.9
Milk and Milk Products	5	1.8
Pork	3	1.1
Poultry	4	1.4
Others[c]	14	5.0

[a]Includes only outbreaks in which the toxin type was determined. In two-thirds of the outbreaks, the toxin type was not determined.

[b]Includes outbreaks traced to tomato relish, chili peppers, chili sauce, salad dressing and chow chow.

[c]Includes outbreaks traced to vichyssoise soup, spaghetti sauce, corn and chicken mash, seal and seal oil, chicken pot pie, beaver tail, beef pot pie, and a vegetable and sausage mixture.

ner, stored for some time and then consumed.

Prevention is simple; follow proper techniques when canning food in the home.

The toxin produced by C. botulinum is readily destroyed by heat. To inactivate toxin, bring food to a boiling temperature and hold that temperature for ten minutes. A good rule to follow is to always boil home-canned vegetables and meats before eating them, particularly if the food in the container, when opened, has a bad smell, bubbles, or looks in some way different.

The habit of tasting home-canned vegetables before they are cooked almost cost one woman her life. The woman became ill one day and became progressively sicker as the days went on. Finally, five days after her initial symptoms appeared, botulism was considered and antitoxin therapy started. Her condition had been diagnosed as viral encephalitis, idiosyncratic reaction to prochloperazine and myasthenia gravis. She recovered eight days after botulinum antitoxin therapy was started.

Food canned in the home under proper conditions for the type of food involved will be safe to eat. Problems only develop when improper canning techniques are used.

Commercially canned products are safe to eat if the can ends are not bulged and if the product appears normal and has a normal odor.

Bulging can ends and jar lids usually indicate spoilage. If it becomes necessary to dispose of canned foods, do it in such a way that there is no chance that they will be eaten by humans or animals.

Commercial outlets for prepared foods, such as grocery stores, delicatessens and restaurants may serve as a source of contaminated food. These are under the jurisdiction of the Nebraska State Agriculture Department and are automatically involved by the State Epidemiologist when the latter receives a report of a human case of botulism.□

STAN WALLEN is assistant professor, food science and technology, Institute of Agriculture and Natural Resources, Lincoln.

BOTULISM INFORMATION SOURCES

Center for Disease Control (CDC) Atlanta, Georgia 30333
Day Phone: (404) 329-3311
Night Phone: (404) 329-3644

Nebraska State Department of Health:
Disease Control Division (Office phone: 402-471-2937)
Paul A. Stoesz, M.D., Director
Home: 402-489-4227

Housing and Environmental Health:
Phone: (402)471-2541

BOTULISM PREVENTION INFORMATION SOURCES:

U.S. Department of Agriculture, Washington, D.C. 20250
Single copies of these publications are free:
G8-Home Canning of Fruits and Vegetables
G106-Home Canning of Meat and Poultry
G93-Freezing Meat and Fish
G162-Keeping Foods Safe to Eat: A Guide for Homemakers.

University of Nebraska Extension Service:
Publications available:
Home Canning Meat and Poultry (HEG-76-19)
Home Canning Fruits and Vegetables (HEG-79-108)

Consumer Protection Center, Department 664G, Pueblo, CO 81009
Publication available:
Home Food Preservation

Several commercial firms have consumer publications on canning methods. Some of these companies include:

Ball Corporation
Muncie, IN 47302

Bernardin, Inc.
2201 W. Maryland
Evansville, IN 47705

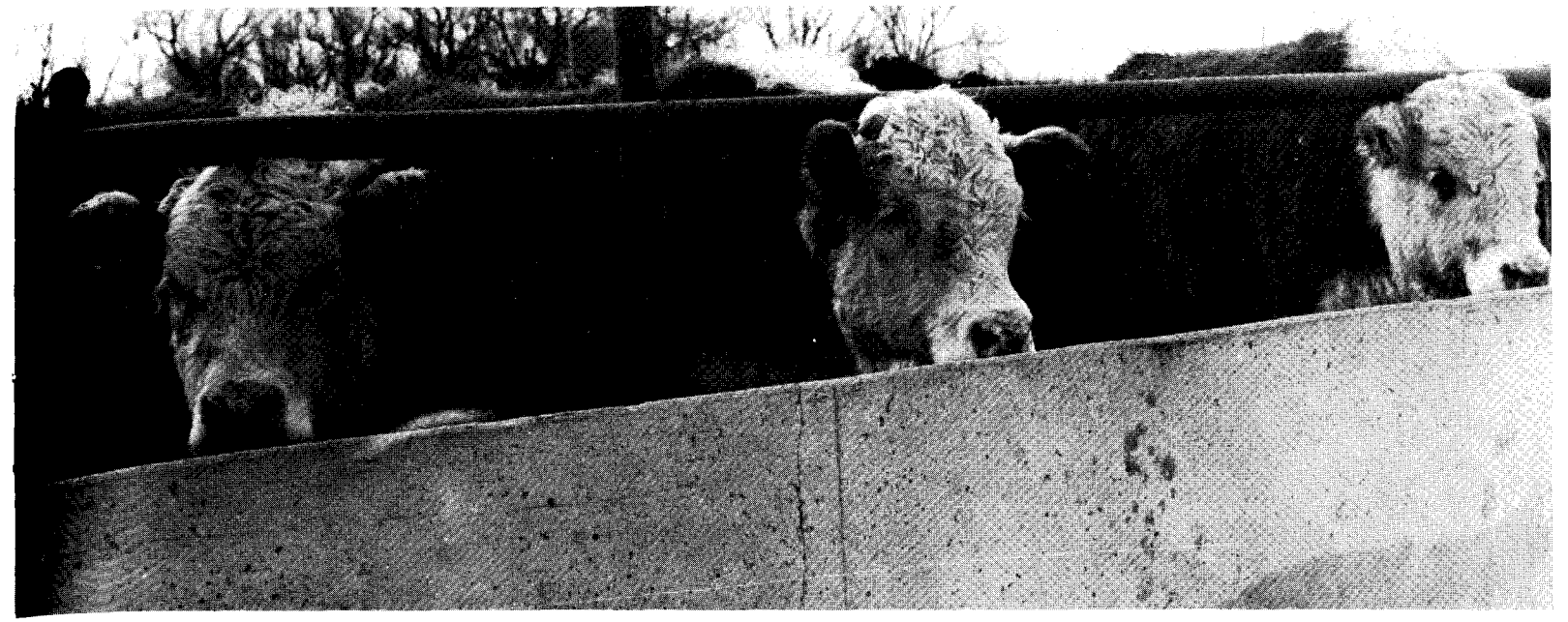
Kerr Glass Manufacturing Corp.
Sand Springs, OK 74603

Mirro Aluminum Co.
Manitowoc, WI 54220

Spoilage of commercially canned food items should be promptly reported to the Food and Drug Administration by telephone or mail. Information in such a report should include:

*The nature of the problem involved
*A detailed description of the product's label
*Any code marks embossed or stamped on the lid of the can
*The name and address of the store where the product was purchased
*The date of the purchase

In Nebraska, such reports should be directed to Carl Larrick, Chief Resident Inspector or Tywanna Paul, Consumer Affairs Officer, Food and Drug Administration, 1619 Howard Street, Omaha, NE 68102 Phone: (402) 221-4675(6)



Pen of Three

Youth Experience in Beef Production

By David Stenberg

Show ring excitement, sale ring drama, hours of halter breaking and grooming are a tradition of 4-H Beef projects. These parts of the 4-H Beef project have contributed to the development of youth. They have been a learning tool in beef production. However, does the 4-H Beef project relate to the real beef industry? Or are there other parts of beef production that need a stronger emphasis?

In answer to these two questions, a new 4-H Beef project was born. The new Dawson County project was named 4-H Pen of Three Beef Feeding Project. The 4-H project is built around the feeding of three calves.

Practicality is the main goal of the project. Practicality is defined as buying, financing, feeding and selling cattle as close as possible to the real beef industry.

The project begins with the buying of three steer or three heifer calves. The 4-H members may buy any type, breed, size or quality of calves they wish. When buying their calves, the 4-H members must remember that they are shooting for a late August slaughter date . . . this is the Dawson County Fair.

One of the requirements of the 4-H Pen of Three Project is that money be borrowed on the purchase price of the three calves. This money must be borrowed from a commercial lending agency, such as a commercial bank, FmHA, PCA, etc. The bankers and lending personnel have been most helpful in explaining the requirements of borrowing money, interest, and paying back money. Also, touring the bank, meeting the banker, and receiving an explanation of the lending business have been positive experiences for the 4-H members.

The 4-H members may feed any type, quality, and quantity of feed they wish. Home-grown feeds should be fed where possible. The kind of cattle the 4-H member buys will influence the length of the growing and finishing phases of the feeding periods.

Two practical methods are used to measure the progress of the 4-H member's ability to feed cattle. They are average daily gain and carcass merit. Both are key methods used by the livestock industry.

In using average daily gain, cattle are individually weighed in January at a county-wide ear tagging and weigh day. This is the official start of the 4-H Pen of Three Project. In August at the Dawson County Fair the Pens of Three are weighed and the average rate of gain is calculated for each pen.

Pens of Three are displayed at the County Fair. A pen card stating the 4-H member name, average rate of gain for the three calves, and the placing in the rate-of-gain contest is placed on each pen for public information. The calves are not groomed, halter broken, or clipped. There is no live judging of the pens.

The other measure is carcass merit. The day before slaughter the cooperating packer posts the prices for carcass beef. The prices are based on carcass weight, USDA quality grade, and sex. The 4-H members now must make a marketing decision. Should they sell or should they take their Pen of Three home? If they decide to sell, they deliver their Pen of Three to the packing plant the next morning.

Both carcass quality grade and yield grade or red meat are measured when placing the Pen of Three carcasses. The carcasses are quality graded and internal fat estimations

(Continued on next page)

Pen of Three . . .
are made by a USDA Meat Grader. The remainder of the carcass data is collected by 4-H parents and leaders. The pen must have an average quality grade of low choice or higher.

The Pen of Three will qualify for special awards if one of the carcasses has a quality grade of average or high good; however, the remaining two carcasses must quality grade high enough in the choice or prime grades to bring the pen average up to low choice. This rule on quality grading is practical since most pens of cattle in the beef industry do not quality grade 100 percent choice.

Another practical rule that was written into the 4-H project concerns death loss. If one of the three calves dies, the other two calves may compete in both the rate of gain and carcass contests. The loss must be verified by a veterinarian or 4-H leader.

The 4-H members are encouraged to enter both the rate of gain and the carcass contests; however, both are voluntary. If the Pen of Three is finished for market before the County Fair, selling the calves early is the best marketing decision. If the calves are underfinished or if the 4-H members are not satisfied with the carcass price, they are not forced to sell through the carcass contest. Learning to make this decision is learning the cattle business.

To encourage participation in the contests, special cash prizes and ribbons are awarded. The owners of the top 10 Pens of Three are given ribbon and cash awards in both the rate of gain and carcass contest. There is a steer and heifer division for both contests, making 40 potential winners. The banks in Dawson County provide $320 in cash awards or $80 in each of the four contests. First place receives $20, second $15, third $10, and fourth through 10th $5 each.

Educational materials are provided by the Dawson County Extension Office and Cooperative Extension Service of the University of Nebraska's Institute of Agriculture and Natural Resources. The 4-H Beef Project Manual (E.C. 2-61) and the circular, Feeding 4-H Market Calves (E.C. 2-62) are the basic 4-H manuals. Slide/cassette tape sets on selecting and feeding 4-H beef, feed types, and meat identification and judging are used. Bankers, feed company nutritionists, veterinarians, meat packers, and other local resource people have been helpful in the educational process. The viewing of the carcasses has given 4-H members a basic knowledge of what is under the hide.

The 4-H Pen of Three Beef Feeding Project is in its sixth year in Dawson County. There have been an average of 63 Pens of Three or 189 calves fed each year. An average of 56 pens have been entered in the rate-of-gain contest with 49 pens selling through the carcass contest.

The key to the popularity of the 4-H Beef Project has been its practicality. Artificial treatments have been held to the minimum. Flexibility in calf selection, choice in feeding program, and marketing has made the 4-H project much like the real beef industry. The required borrowing of money from a commercial lending agency has added to the learning value of the 4-H project.

Four-H leader, parent, and ag industry involvement and cooperation have been great. A committee of 4-H parents and leaders eartag and weigh calves, calculate rates of gain, collect carcass data, and tabulate carcass results. The adults as well as 4-H members have been important in the development and evaluation of the 4-H Feeding Project.

The 4-H Pen of Three Beef Feeding Project was designed:

- To teach 4-H members how to choose fast-gain calves that produce meaty carcasses.
- To gain knowledge in credit financing.
- To give practical experience in feeding rations for optimum gain, and
- To provide marketing insights through the carcass contest. The people of Dawson County feel that practical beef feeding is being taught through the 4-H Pen of Three Beef Feeding Project.□

DAVE STENBERG is county agent in Dawson County.

Applicators

By Russ Lang and John D. Furrer

How can I save my aching back and still get the volunteer corn out of soybeans?

This question is frequently asked during the summer throughout the soybean belt of Eastern Nebraska. Soybeans do not compete well with weeds, particularly taller, fast growing, grassy weeds including volunteer corn, shattercane and Johnsongrass. These weeds reduce yields, cause harvest problems and can reduce soybean seed quality with mixtures of crops. Grassy weeds also promote corn rootworm problems in fields that will be planted to corn the next year.

To control corn and shattercane problems, thousands of acres of soybeans are walked each summer. This is hard, hot work. Farm families would welcome anything that promises to reduce this back-breaking work.

Relief has been found in new types of herbicide applicators that apply herbicide to the weeds without getting any on the crop. Recirculating sprayers, weed rollers and wick action applicators rely on height differential to selectively treat taller-growing weeds in shorter-growing crops. They do not eliminate all weeds in soybean fields; however, they can provide partial weed control, are relatively inexpensive to operate and require only $1.00 to $5.00 worth of herbicide per acre. The cost of herbicide is largely dependent on the number of weeds present in the field. With this new generation of sprayers and applicators, the more weeds present, the more herbicide used. Using the herbicide *Roundup* (glyphosate), these special applicators are particularly effective against taller grassy weeds including volunteer corn, shattercane and Johnsongrass. At the same time an application can reduce populations of common milkweed, hemp dogbane, sunflowers and other tall, broadleaf weed escapes. *Roundup* herbicide

Tested for Soybean Herbicide Control

is a non-selective herbicide that is translocated to the roots of plants that are sprayed or touched with the herbicide solution. It will kill nearly all types of plants. Fortunately, however, soybeans are relatively tolerant to *Roundup*. By using one of the special applicators, farmers can get effective weed control with one or two trips through the field with minimum injury to soybeans, and at the same time, reduce labor input considerably.

University of Nebraska weed scientists conducted several special applicator demonstrations in eastern Nebraska this past summer. One such demonstration was held on the Mick McGinnis farm near Nickerson on July 18. Five different applicators were used in this trial. They were the broadcast recirculating sprayer (weed sickle), which sprays back into a plastic pad; the catch basin recirculating sprayer which sprays into boxes for recovery of the spray mixture; the wet canvas applicator which is a closed sprayer system, spraying onto a canvas which wipes the herbicide mixture onto the weeds; a rope wick applicator which wipes on the herbicide mixture; and the roller applicator which rolls on the herbicide using a slowly revolving wet drum covered with carpet, making it similar to a giant paint roller. (See Figure 1.)

In this same trial, field speeds were varied to compare 2 mph, (3.2 kph) 4 mph (6.4 kph) and 6 mph (9.6 kph) operational speeds. The 2 mph (3.2 kph) speed seemed to waste tractor and operator time and did not improve herbicide performance. Four mph (6.4 kph) seemed most appropriate. The 6 mph (9.6 kph) speed tended to reduce control with most of the machines tested, due to plant whipping, poor coverage and less precise machine operation.

The rope wick, wet canvas and roller applicator did not do a complete job of herbicide coverage on corn clumps with one pass through the field. It was necessary to make two passes through the field, one in each direction in order to get good corn and shattercane control where clumps were present. Only one trip was needed with weed sickle and box type recirculating sprayers.

It is also noted that timing of the application is important. The farmer should wait until the weeds are at least 12 inches higher than the soybean crop. This is usually found after the 10th of July. A second application about the 25th of July could kill additional weeds and corn that escaped the first pass through the field. The second application is dependent on growth of the soybeans, height of the weeds, row width and other factors.

These sprayers and applicators will get only taller weeds and do the best job against grassy weeds. Hand-roguing may still be necessary if a farmer wants a field free of velvetleaf and low growing cocklebur and foxtail.

From experiences this past summer, it is apparent that a recirculating sprayer, weed roller or rope wick applicator can be an effective new tool in the farmer's arsenal as he does battle against weeds.□

Figure 1. Trial results

Machine	Herbicide Concentration (%)	Corn Control (%)	Soybean Damage*
Weed Sickle	5	95	21
Catch Basin	2.5	96	18
Wet Canvas	10	60	1
Rope Wick	33	80	3
Roller	5	75**	0

*Damage was estimated as the percent of soybean plants "yellowed" by the herbicide. The majority of these plants recovered and yields were reduced slightly, if at all.

**Reduced control with the roller applicator may have been due to inadequate moisture on the carpet of the roller. In other trials the roller has performed with the recirculating sprayers.

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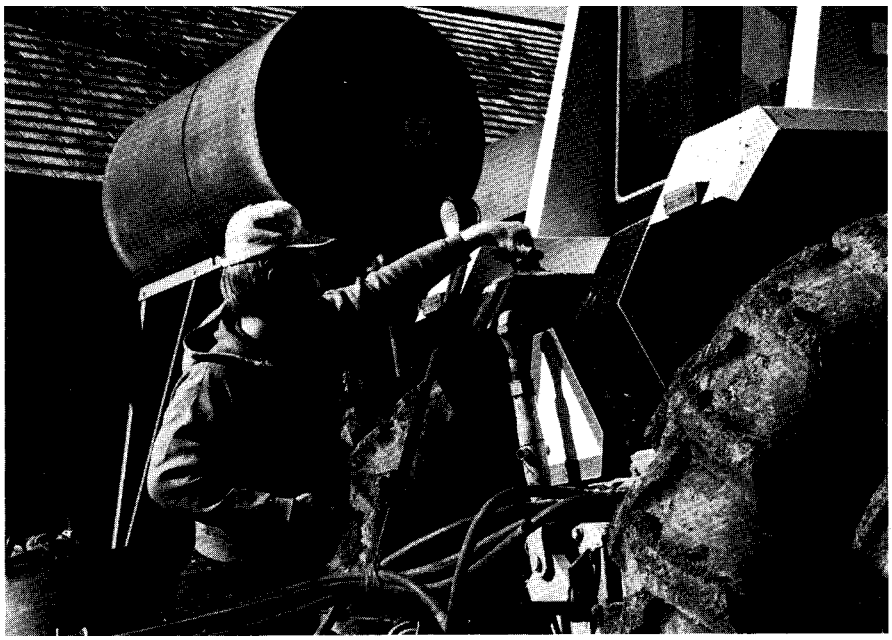
Demonstrations for the control of weed escapes in soybeans have been funded in part by a grant from the Nebraska Soybean Development, Utilization and Marketing Board.



Concern about energy use has prompted study of farm operation energy use.

Fuel Survey

Keeping Tabs on Energy Use

By David P. Shelton and Kenneth Von Bargen

How much fuel does each of your farming operations take? One hundred Nebraska farmers helped answer that question during 1976 and 1977, when an on-farm fuel use survey was made. This survey was part of a pilot Agricultural Energy Management Program conducted in Kansas and Nebraska. The pilot program focused on energy management practices and fuel use for agricultural operations, ("Farmers Keep Tabs on Energy," *Farm Ranch, and Home Quarterly,* Winter 1977).

Fuel supply tank meters were used to measure fuel use. For simple record-keeping, an Energy Use Handbook was also used. Fuel use was recorded each time the fuel tank of a tractor or self-propelled machine was filled.

Over 11,000 handbook entries recorded the fuel used for field operations. Of these, two-thirds were for diesel fuel and one-third were for gasoline. In all, 255,099 gallons (965, 655 L) of diesel fuel and 63,231 gallons (239,355 L) of gasoline were recorded. Diesel fuel supplied 4.5 times as much total energy as gasoline, or 82 percent of the total energy used.

In general, the amount of fuel used for each of the major crops matched the ranking of that crop. Corn, for example, used 35 percent of the energy. About 35 percent of Nebraska cropland is in corn production.

Power Units

As expected, tractors used most of the fuel. Tractor-powered operations used 92 percent of the diesel fuel and 63 percent of the gasoline. Overall, diesel tractors used 6.6 times more total energy than gasoline-powered tractors. This indicates that diesel tractors have largely replaced gasoline tractors on Nebraska farms.

Most field operations were performed by tractors rated between 70 and 160 hp (52 and 119 kW). Of the 380 tractors involved in the survey, 49 percent were rated between 30 and 70 hp (22 and 52 kW), 49 percent were rated between 70 and 160 hp (52 and 119 KW), and 2 percent were over 160 hp (119 kW).

Most of the self-propelled machines in the survey were combines and windrowers. Self-propelled combines used 6.5 percent of the diesel fuel and 29.4 percent of the gasoline. However, both fuels supplied about the same amount of energy for combine harvesting.

Gasoline provided 1.4 times as much energy as diesel fuel for other self-propelled machines. For these machines, gasoline is still an important source of energy on Nebraska farms.

Fuel Use for Operations

Tillage operations used the most fuel and energy, 42.7 percent of the diesel fuel and 35.4 percent of the total energy, as seen in Table 1. Just three tillage operations—discing, chisel plowing, and moldboard plowing—used nearly one-quarter of the total energy.

Fuel use in gallons per acre (liters per hectare) was also calculated from the survey data. Diesel fuel use is summarized in Table 2 for the major operations performed on Nebraska farms. The fuel use values for each operation are averages, and include all crops and situations from the survey. Variations of 25 percent or more above and below these average values can be expected.

Gasoline fuel use can be estimated from the values in Table 2 by multiplying the diesel fuel values by 1.42. This factor was determined from the Nebraska Tractor Test reports for the past 10 years. Only tractors from U.S. manufacturers rated between 70 and 160 PTO horsepower (52 and 119 KW) were evaluated in this estimation.

Fuel use for harvesting grain with self-propelled combines was dependent upon the crop. Of the major crops, corn required the most fuel—1.25 gallons of diesel fuel per acre (11.69 L/ha) and wheat required the least—0.72 gallons per acre (6.73 L/ha).

Three haying operations; mowing, baling, and stacking, were unusual because the diesel fuel use per area worked was greater than the gasoline use, (Table 3.) For stacking, this difference was more than double. Part of this difference may be due to different definitions of stacking hay as operation of stack wagons and piling hay after sweeping were both classified as "stacking" by the survey farmers.

Tractor selection and operation also accounted for part of the fuel use difference. Stack wagons, balers, and to some extent, mowers, require operation at standard PTO speed. Diesel tractors powering these machines probably had a much higher

power rating than the gasoline tractors. The diesel tractors operating at rated speed, but at less than full power would use more fuel than the more nearly matched gasoline tractors. The higher powered diesel tractors would also be heavier, requiring more fuel to overcome rolling resistance. Also, many of the diesel tractors had air conditioning. It appears that, as a matter of convenience and comfort, overpowered tractors were sometimes used for certain operations. For lighter load operations not requiring PTO operation, such as raking, the practice of gearing-up and throttling-down may have been used. This practice can result in a fuel savings of up to 30 percent over full-throttle operation.

Factors Affecting Fuel Use

Many factors affect the amount of fuel used to perform an operation. Examples are: road travel, idle time, field size, field speed, working depth, soil type and conditions, and the make and conditon of the engine.

As expected, soil type greatly influenced diesel fuel use for tillage operations. Heavier silt loam soils required more fuel than lighter sandy loams. This difference ranged from 17 percent for discing to 52 percent for springtooth harrowing.

Working depth also affected fuel use. The average working depth for all chisel plowing was 5.3 inches (135 mm) and the average diesel fuel use was 0.71 gallons per acre (6.64 L/ha). Wheat and fallow were chiseled at an average depth of 4.5 inches (114 mm) and used 0.62 gallons per acre (5.80 L/ha). Chiseling for corn, in contrast, used 1.06 gallons per acre (9.92 L/ha) at an average depth of 10.0 inches (254 mm).

The amount of land worked at one time affected fuel use. As a general rule, fuel use was higher for smaller areas worked. For example, one cooperator had 43 Handbook entries for chopping silage with a diesel-powered field chopper. Approximately half of the entries were for areas of 20 acres (8 ha) or less. For these smaller areas, the average fuel use was 2.49 gallons per acre (23.29 L/ha). However, for areas over 20 acres (8 ha), the average fuel use was only 1.60 gallons per acre (14.97 L/ha). Fuel consumed for road travel probably accounts for most of this difference.

As fuel costs continue to rise and supplies become tighter, we all need to be more conscientious about our fuel use. One hundred Nebraska farmers have helped us to start.□

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Table 1. Summary of fuel and energy used in the survey.

Operation Category	Total Energy Use (percent)	Diesel Fuel Use (percent)	Gasoline Use (percent)
Tillage	35.4	42.7	2.7
Miscellaneous Operations	15.3	15.5	14.4
Transporting, handling, etc.	12.3	9.7	23.9
Combine harvesting	10.7	6.7	29.1
Haying	6.8	3.6	21.0
Cultivating	6.0	6.5	3.6
Applying fertilizer	5.0	5.9	0.6
Row-crop planting	3.7	4.2	1.4
Chopping silage	2.9	3.1	1.5
Drilling grain	2.0	2.1	1.7

Table 2. Summary of diesel fuel use for the major operations in the survey.

Operation	Gallons/Acre	Liters/Hectare
	Tillage	
Cultivating	0.43	4.02
Discing	0.74	6.92
Field Cultivating	0.50	4.68
Springtooth Harrowing	0.54	5.05
Chisel Plowing	0.71	6.64
Moldboard Plowing	1.57	14.69
Sweep Plowing	0.76	7.11
Rodweeding	0.54	5.05
Rotary Hoeing	0.26	2.43
	Planting	
Surface	0.51	4.77
List	0.51	4.77
Rotary Bed	1.39	13.00
Drilling Grain	0.40	3.74
	Miscellaneous	
Chopping Silage	1.56	14.59
Chopping Stalks	0.49	4.58
Ditching	0.49	4.58
Fertilizing, Dry	0.28	2.62
Fertilizing, Knife	0.59	5.52
Spraying	0.23	2.15
Combine Harvesting	1.07	10.01

Table 3. Fuel use for haying operations.

Haying Operation	Gallons/acre	Liters/Hectare
	Diesel Fuel	
Mowing	0.57	5.33
Windrowing	0.57	5.33
Raking	0.33	3.09
Baling	0.47	4.40
Stacking	0.85	7.95
	Gasoline	
Mowing	0.53	4.96
Raking	0.35	3.27
Baling	0.41	3.84
Stacking	0.35	3.27

Creativity in Young Children

By Lynda Wilks and Violet Kalyan-Masih

All children are naturally creative, but their abilities differ in strength, degree and expression. How to recognize and stimulate creative thinking is a concern of parents, teachers and other adults.

Researchers have been studying creativity since the early 1950's and, among other things, have suggested that:

•Creativity is not measured by IQ test alone. (Though some correlations between IQ and creativity have been noted, Torrance has suggested that above 120 IQ this relationship begins to break down. According to the same researcher, about 70 percent of creative children are missed by depending solely on IQ as the criterion).

•Teachers and parents are not always able to recognize creativity in young children. Getzels and Jackson (1962) showed that teachers preferred to have high IQ children, and those who were industrious, obedient, and popular in their classroom rather than highly creative children with wild ideas.

•Creativity can be fostered in the proper environment. It needs to be nurtured and developed from birth.

Recently, investigations were conducted on the creative thinking of 68 children ranging in age from 81 to 128 months. Thirty-three were girls and thirty-five boys and all belonged to upper-middle-class white families. The children were tested and interviewed in their homes in a play-like atmosphere and each session was taped.

Using the Torrance Test of Creative Thinking, entitled: "Thinking Creatively with Words", the creativity, with its three components of fluency, flexibility and originality was assessed. As defined by Torrance, "fluency" is the ability to produce a large number of ideas; "flexibility" is the ability to produce a large variety of ideas; and "originality" is the ability to produce unusual ideas. Thus, a creative child not only produces a large number of ideas, but also a large variety of different and unusual ideas.

Scores on Torrance's test ranged from 19 to 172. Twelve children were in the high creativity group, forty-eight in the middle group and eight in the low group. Children were presented with an improbable, hypothetical situation and asked to think of imaginative solutions. On one such task, children were asked to imagine what would happen if clouds had strings on them hanging down to earth. The following excerpts show the responses of highly creative children:

"Strings could weave a rainbow."

"You could use the strings to lasso a whole forest if you needed firewood."

"You could just sleep on the clouds and never need beds."

"The whole world could live up in the clouds and you could talk to anybody you wanted to. You wouldn't have to move to Philadelphia."

"You could jump to the moon after touching the strings 150 times."

"If it was a hot day, people could attach gigantic ice cubes onto the strings and do a tap dance on them."

"You could tie the strings to a stick and go fishing with them."

"Clouds would move and knock over skyscrapers."

"The strings could make a volcano erupt, if they hit a mountainside."

The following are a few sample responses of low creativity groups:

"It would look like rain."

"They would be in people's way."

"Birds wouldn't be able to fly easily."

"The planes would run into them."

"It wouldn't look nice."

"The strings would break if you pulled them."

"There wouldn't be any room to walk."

"People could go up to the clouds."

"Kids would grab them."

This sample showed a significant difference in the fluency, flexibility, and originality of ideas between the high and low creativity groups.

This study tested 21 hypotheses relating to intelligence, creativity, fantasy, teacher and parent perception of creativity and intelligence. However, this report will be restricted to a few of the questions only. Do teachers recognize creativity in their pupils? Do parents recognize it in their children? Is intelligence related to creativity? Are there notable sex differences in creativity?

A questionnaire (derived from Torrance's theory of creativity) was designed for rating children's creativity by teachers and parents. The Peabody Picture Vocabulary Test (PPVT) to assess verbal intelligence and the Wechsler Intelligence Scale for Children (WISC-R) to assess general intelligence were used. Torrance's Test of Creative Thinking was used for assessing the three components of creativity—fluency, flexibility, and originality.

Analysis of data suggests that teachers were able to recognize creativity in their pupils to a limited extent only. Teachers' ratings of their pupils' creativity corresponded significantly with their obtained scores on Torrance's test. The correlations, however, were low, so the results must be interpreted rather cautiously. It may have been due to the fact that the questionnaire provided elaborate behavioral definitions of fluency, flexibility and originality. These findings are not supportive of previous research findings that teachers were unable to recognize their pupils' creativity.

Although teachers in this sample recognized creative thinking in their pupils to a limited extent, parents were unable to recognize any of the components of creativity in their children. This study found no significant relationship between PPVT IQ and Torrance's test of creativity. Low, but significant, correlations were obtained between WISC-R I.Q. and two components of creativity—flexibility and originality. But only five and six percent respectively of the total common variance could be explained by these low correlations. So the results need not be interpreted as spectacular.

No significant sex differences were noted on intelligence or creativity measures. The mean scores of girls (35.03, 12.28, 28.14) were consistently higher than the mean scores of boys (31.0, 11.56, 25.06) on fluency, flexibility, and originality, but these differences were not significant. These findings do not support an earlier study by Torrance done in 1965 in which boys were found to be superior on most tasks of creative thinking from first through fourth grades. Also, on Singer's Fantasy Questionnaire (not included in this report) girls reported significantly more involvment in make-believe play than boys. This may not be interpreted to mean that girls are more imaginative than boys, but a reasonable conclusion is that cultural and behavioral expectations have allowed girls to develop their abilities to dream more.

In conclusion, findings show there is very little relationship between traditional IQ and creativity; girls are as creative as boys; teachers to a

(Continued on next page)

Creativity . . .

limited extent can, but parents cannot identify creative children. If creative thinking is to be developed among children, its manifestations need to be recognized early and fostered accordingly. It is possible that in an environment where creative thinking is not recognized, sufficient opportunities for its development are not provided. Further, because creative children differ from children less creative in personality and behavior, they may be misunderstood. Essentially, their nonconforming behavior may get them in trouble and thus hamper natural tendencies.

Often creative children and adolescents may be distinguished by their personality characteristics, according to researchers, Torrance reports that creative children prefer to learn on their own; search for a purpose; like to attempt difficult tasks; may not be well-rounded; have a reputation for having wild and silly ideas and are humorous, playful and relaxed.

In addition, they may engage in fantasy; become very involved in listening, observing and doing; lose awareness of time; ask penetrating questions; and display an eagerness to tell others about their discoveries. As adolescents, they are often unconventional, high achievers, flexible, intuitive, experimental, innovative and independent.

Creative thinking may be stimulated according to Torrance by being respectful of unusual questions; being respectful of imaginative, wild and silly ideas; showing children that their ideas have value; having children explore, experiment; doing things independently; and tying in evaluation with causes and consequences.

Creative children are thinkers, dreamers and innovators. Someone had the wild idea of playing golf on the moon. Someone did just that. Creative thinking has no bounds and limits.□

LYNDA WILKS is a former graduate student in Human Development and the Family; VIOLET KALYAN-MASIH is associate professor, Human Development and the Family.

Education and facilities have taken numerous steps forward from times past.

Education Importance and Satisfaction

QUALITY of LIFE

By Florence S. Walker

Education is prized by many as a stepping stone to survival and success. Today's complex issues faced by people and their governments require well-informed, logical responses. One of the best ways to develop our decision-making capability is through formal educational programs. Thus, it was natural to include a section on education and schooling in the Nebraska Quality of Life research project.[1]

The Nebraska Quality of Life project collected data in 1977 from one urban and one rural town in the eastern part of the state. Respondents were randomly selected according to the geographical location of their homes and personal interviews were conducted with the residents. The 208 people who participated are considered to represent a typical cross-section of eastern Nebraska. Other reports drawn from the same data base were published in earlier editions of the *NEBRASKA FARM, RANCH AND HOME QUARTERLY*. (See Volume 26, Spring, 1979, and Summer, 1979.)

The typical person in this study, disregarding residential location, had lived in the community for 21 years, was 46 years old, married and had 3 persons living at home, was a high school graduate, employed on a year-round basis and reported a 1976 income between $15,000 and $20,000. (Based upon medians.) Some statistically significant differences were found when these same characteristics were studied by residential location.[2] Higher proportions of rural town respondents were age 60 or older and had lived longer in the same community. Urban-rural town differences were further reinforced by higher proportions of small families found in the rural town. No differences associated with residential location were found for 1976 family income, year-around employment nor number of

years of schooling. Yet, there was some skewing of the distribution with regard to schooling. Higher proportions of rural town residents were at the low end of the distribution of years of schooling while the opposite was true for the urban residents.

Three aspects of education are highlighted in this report: (1) attitudes toward accessibility and quality of local schools, (2) amount of education respondents had obtained and (3) usefulness of their education. Queries were phrased in terms of satisfaction with these educational aspects as well as the degree of importance each had to the quality of their lives. Respondents answered each of these questions by selecting one of the seven alternative responses: "extremely dissatisfied" to "extremely satisified", or, "extremely unimportant" to "extremely important". The information on education was studied with respect to respondents' demographic characteristics, including the schooling attained by the head of the families and the value placed upon education. Profiles of the respondents grouped by these latter traits are given in Table 1 and Table 2.

To establish the relative importance of certain values and as a means of grouping subjects, the respondents were asked to rank nine familiar aspects of their lives. Almost two-thirds of them selected 'family' as the most important aspect on the list. This was followed (in decreasing order of popularity) by: religion, financial security, education, work, friends, housing and community. No one selected leisure-recreation, the ninth familiar aspect on the list, as the most important of the nine. But it was the most frequently selected aspect to be rated as least important. Education was selected as the second most important value by eight percent of the study while thirteen percent indicated it was third in importance.

For comparison purposes, those who ranked education as one of the top three most important aspects of their lives were placed in the group, "high value", while those who ranked education as one of the three least important aspects of their lives were placed in the group, "low value". The remainder were put in the group, "average value".

The Local Schools

Community differences in attitudes toward local schools exist, according to this study. Overall, the rural town people were more satisfied with the accessibility and quality of the local schools than were the urban people. However, there was no difference due to residential location in the importance of schools to the quality of the respondents' lives.

When residential location was considered with other characteristics of the respondents, the effect of residential location was often strong enough to cause minor differences in the secondary trait to become statistically significant.[2] Several features mark rural town respondents who were more satisfied with accessibility and quality of the local schools:

—family heads had 1-3 years of schooling beyond high school,

—respondents placed a low value on education,

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TABLE 1. DEMOGRAPHIC PROFILES BY FAMILY HEADS' SCHOOLING[1]

DEMOGRAPHIC FACTOR	FAMILY HEADS' SCHOOLING: High School or less	High School +1-3 years	College or more	Sample	Size
	(PERCENT)				
-RESIDENTIAL LOCATION				(N)	(%)
Urban	47.6	23.8	28.6	147	71.0
Rural-town	61.7	21.7	16.7	60	29.0
TOTALS				207	100%
-HEAD'S AGE					
30 years old or less	50.0	32.5	17.5	40	19.3
31-65 years	47.7	22.0	30.3	132	63.8
66-84 years	68.6	17.1	14.3	35	16.9
TOTALS				207	100%
-FAMILY SIZE					
1-2 persons	56.7	25.6	17.8	90*	43.5
3-4 persons	50.0	25.0	25.0	80	38.6
5-9 persons	43.2	13.5	43.2	37	17.9
TOTALS				207	100%
-PRESENCE OF CHILDREN				(N)	(%)
Childless	39.4	39.4	21.2	33	15.9
All children at home	50.0	23.0	27.0	74	35.7
Some children at home	45.2	21.4	33.3	14	20.3
All children gone	65.5	15.5	19.0	58	28.0
TOTALS				207	100%
-WIFE WORKS FOR PAY					
No	52.2	14.5	33.3	69*	34.3
Yes	46.3	28.8	25.0	80	39.8
No wife	59.6	28.8	11.5	52	25.9
TOTALS				201	100%
-FAMILY INCOME IN 1976				(N)	(%)
No income	-	-	100.0	1*	0.5
Up to $4,999	83.9	12.9	3.2	31	15.9
$5,000 to $11,999	56.5	32.6	10.9	46	23.6
$12,000 to $19,999	50.9	27.3	21.8	55	28.2
$20,000 to $29,999	50.0	29.4	20.6	34	17.4
$30,000 to $39,999	33.3	4.8	61.9	21	10.8
$40,000 and higher	-	-	100.0	7	3.6
TOTALS				195	100%
-VALUE OF EDUCATION					
High value	52.0	20.0	28.0	50	24.2
Average	45.3	26.3	28.4	95	45.9
Low value	61.3	21.0	17.7	62	30.0
TOTALS				207	100%

1—Data collected in 1977, random sample, N=208
*—Significance=0.05 level or better, chi square statistic

Satisfaction . . .

—all children were living at home,

—family heads were less than 30 years old,

—families had chronic health problems,

—families had wives who worked for pay.

The one urban trait associated with a high degree of satisfaction with local schools was families of three or four members.

Traits that indicated statistical differences, regardless of residential location of respondents were: schooling of the family heads and value placed upon education. Those who were more satisfied with local schools usually had family heads with a college degree or possibly more schooling, as well as were respondents who placed a low value on education.

A second question dealt with the importance of local schools to the quality of the respondents' lives. When residential location was considered jointly with other characteristics of the respondent two traits stand out: family heads' age and wives who worked for pay. These features mark those rural town residents who indicated the local schools were of above average importance to the quality of their lives:

—family heads' ages were between 31 to 65,

—wives did not work for pay.

Subjects, considered apart from residential location, who indicated the local schools had an above average degree of importance to the quality of their lives had one of these traits:

—were from a 5-9 member family,

—had family heads in the age range of 31-60,

—had all children living at home.

It was disappointing to discover that the two characteristics expected to affect the importance of the schools to quality of life, namely, groupings of respondents by value placed on education or by years of schooling for family head, did not.

Fewer demographic factors were associated with respondents appraisal of the importance of the local schools to the quality of their lives than with their satisfaction with the quality and accessibility of local schools. This agrees with the general observation found in earlier analyses on family relationships, namely, that there is a greater consensus on importance of facets in one's life than for the satisfaction one has with them.

Educational Attainments

Respondents were questioned about the usefulness, as well as, the amount of education they had obtained. Each question was posed to consider both satisfaction and importance to the quality of the respondents' lives. When residential location was considered with other traits, two traits were important: the schooling family heads had obtained and the value respondents placed upon education. These traits indicated that rural town subjects were above average in the satisfaction they expressed with the amount of education they had received:

—family heads had 1-3 years of schooling beyond high school,

—respondents placed a low value on education.

Regardless of residential location, those families with heads who had graduated from college or had some schooling beyond college were more satisfied than the average respondent with the amount of education they had received.

Those more satisfied with the usefulness of their education also:

—had a college degree or more schooling

—placed an average value on education.

TABLE 2. DEMOGRAPHIC PROFILE BY VALUE OF EDUCATION[1]

DEMOGRAPHIC FACTOR	VALUE OF EDUCATION Low	Average	High	Sample Size	
	(PERCENT)			(N)	(%)
-RESIDENTIAL LOCATION					
Urban	25.0	50.0	25.0	148	71.2
Rural-town	41.7	36.7	21.7	60	28.8
TOTALS				208	100%
-HEAD'S AGE					
30 years old or less	22.5	45.0	32.5	40	19.3
31-65 years	30.8	45.1	24.1	133	63.9
66-84 years	34.3	51.4	14.3	35	16.8
TOTALS				208	100%
-FAMILY SIZE					
1-2 persons	35.6	37.8	26.7	90	43.3
3-4 persons	24.7	50.6	24.7	81	38.9
5-9 persons	27.0	56.8	16.2	37	17.8
TOTALS				208	100%
-PRESENCE OF CHILDREN					
Childless	30.3	45.5	24.2	33	15.9
All children at home	20.3	52.7	27.0	74	35.6
Some children at home	36.2	41.9	22.4	43	20.7
All children gone	37.2	41.4	20.9	58	27.9
TOTALS				208	100%
-WIFE WORKS FOR PAY					
No	30.4	49.3	20.3	69	34.2
Yes	30.9	48.1	21.0	81	40.1
No wife	28.8	36.5	34.6	52	25.7
TOTALS				202	100%
-FAMILY INCOME IN 1976					
No income	-	-	100.0	1	0.5
Up to $4,999	38.7	29.0	32.3	31	15.8
$5,000 to $11,999	34.8	39.1	26.1	46	23.5
$12,000 to $19,999	33.9	44.6	21.4	56	28.6
$20,000 to $29,999	20.6	61.8	17.6	34	17.3
$30,000 to $39,999	23.8	52.4	23.8	21	10.7
$40,000 and higher	-	57.1	42.9	7	3.6
TOTALS				196	100%

1—Data collected in 1977, random sample, N=208

*—Significance=0.05 level or better, chi square statistic

The amount of schooling and satisfaction with schooling received can also be linked with support of the local schools, particularly support of building programs for new facilities.

There was an inclination for urban families, who placed an average value on education, to be among those most satisfied with the usefulness of their education.

The only characteristic associated with the importance of the amount of education respondents had received, was the achievement of a college degree or more schooling. This relationship was positive.

Conclusions

The above analyses suggested certain conclusions. One was that the more schooling respondents had obtained, the more satisfied they were with their education. One exception to this was the highly schooled rural town individuals. They were less likely to express as much satisfaction with their education as their urban counterparts. This may be related to the lower level of schooling obtained by the majority of rural town respondents (as indicated on Table 1) or possibly that those in rural town settings were not realizing the economic returns generally attributed to education.

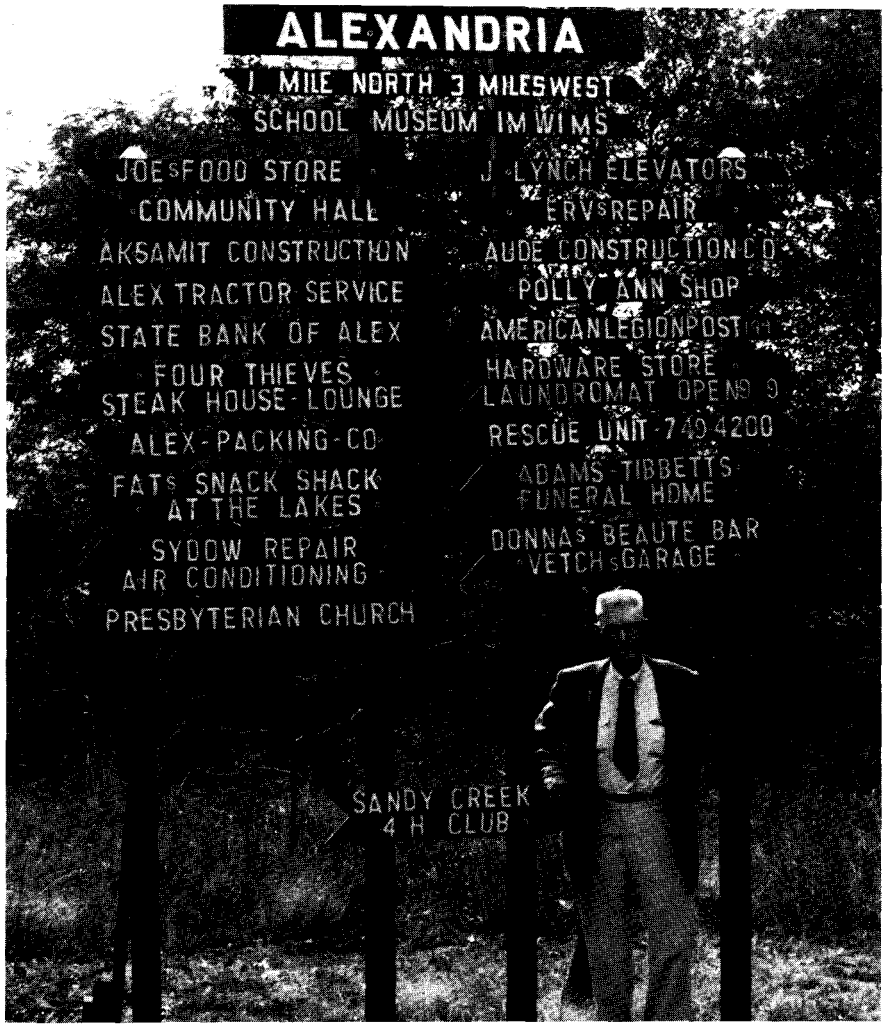
It was also concluded that those having contacts with the schools were more satisfied with them. This reinforced the generalization that those whose family members were currently attending school generally form one nucleus of support for local schools. It may be important to note that value placed on education was inversely related to approval of local schools, while as the amount of schooling increased, approval for education increased.

FOOTNOTE

(1.) The data for this report are a part of the research project NC-128, "Quality of Life as Influenced by Area of Residence," sponsored by the Agricultural Experiment Stations of Arizona, California, Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Nevada, Ohio and Texas in cooperation with Science and Education Administration Cooperative Research, The United States Department of Agriculture.

(2.) Findings reported in this article were statistically significant at the 0.05 level of probability or better. Statistical techniques on which this report was based include chi square, oneway and twoway analysis of variance. For more information about statistical tests, contact the author.

Alexandria: *A Study In Community Development*



One of the most recent projects of Hugo Broeder (pictured) and the Sandy Creek 4-H club is the Alexandria Business Directory at the State Recreation Area.

By Terry Meisenbach

Alexandria is a small town in southeast Nebraska. Small, that is, in terms of population only. The 230-member community has developed their town, through a variety of unique programs, into a "big" part of Thayer County.

The driving force behind this community development is a 77-year-old bachelor and the 4-H club he leads. Hugo Broeder and his Sandy Creek 4-H Club have thought up, received funds for and implemented numerous projects to make Alexandria a better place.

The Leader

Hugo is probably the most enigmatic part of the Alexandria improvement story and a question that comes to mind immediately is: "How does a bachelor, with relatively few family ties to Alexandria, become a 4-H leader with great impact on his club members and a community leader concerned about community development?"

The answer is that Hugo is a giver. And the most important thing he's given is himself. Hugo lives north of Alexandria and is a semi-retired farm hand. He was born near Alexandria and has spent the greatest share of his 77 years in and around the community. Hugo has done a lot of things in his lifetime. He's been a rancher in Lincoln County and worked on a farm for 37 years for the same man in Thayer County. But of all the things he's done, he'd probably say he's proudest of his 30 years as a 4-H leader.

Hugo first began his 4-H career in Lincoln County with the Meadow Lawn Rope Club. Their first meeting (from an original secretary's notebook) was on October 19, 1930. Hugo was never a 4-H member, but he taught Sunday School and knew a lot of young people in Lincoln County. George Kellogg, Lincoln County agent at the time, recruited Hugo as a leader and his long association with 4-H began. They decided to start the club with the rope project during the winter "so the kids could get an idea of what 4-H was all about," said Hugo.

In the spring, they began a livestock club and as far as Hugo can recall, it was the first mixed livestock club in Nebraska. "A few of the kids couldn't afford a calf, so after talking with state officials they were allowed to take sheep," said Hugo. He still has the original charter from that club and also has a practice rope, sent to him by a former club member, from the original rope project.

World War II brought Hugo back to Alexandria and it wasn't long after his return that he became involved again in 4-H work, by organizing the Sandy Creek 4-H Club.

Hugo's involvement and leadership has been essential in not only the community development aspect of the Sandy Creek club, but also in the development of many of his club members.

According to Marv Sefrna, Seward County extension agent and former Thayer County agent, "Hugo has been a strong promoter of public speaking, demonstrations, etc. and that emphasis has produced club members as adults who have been very successful."

Hugo's former club members have assumed various professions including a minister, veterinarian, nutritionist, grocery store owner, printer and an agricultural engineer.

Dave Kerwood, an agricultural engineer for Allis Chalmers, is probably one of Hugo's prize club members. Dave began his work with Hugo at age 9, following his older brother into 4-H. Dave's involvement in 4-H projects, of a wide variety at Hugo's urging, helped him win two national 4-H awards and scholarships and other state and local awards.

"If it weren't for Hugo, I wouldn't be where I am today," said Dave. "Hugo's guidance and 'pushing' helped me get to my present situation and helped me with the scholarships. He's very understanding and patient person to stick with 4-H for 30 years. He really believes strongly in the 4-H program and loves kids."

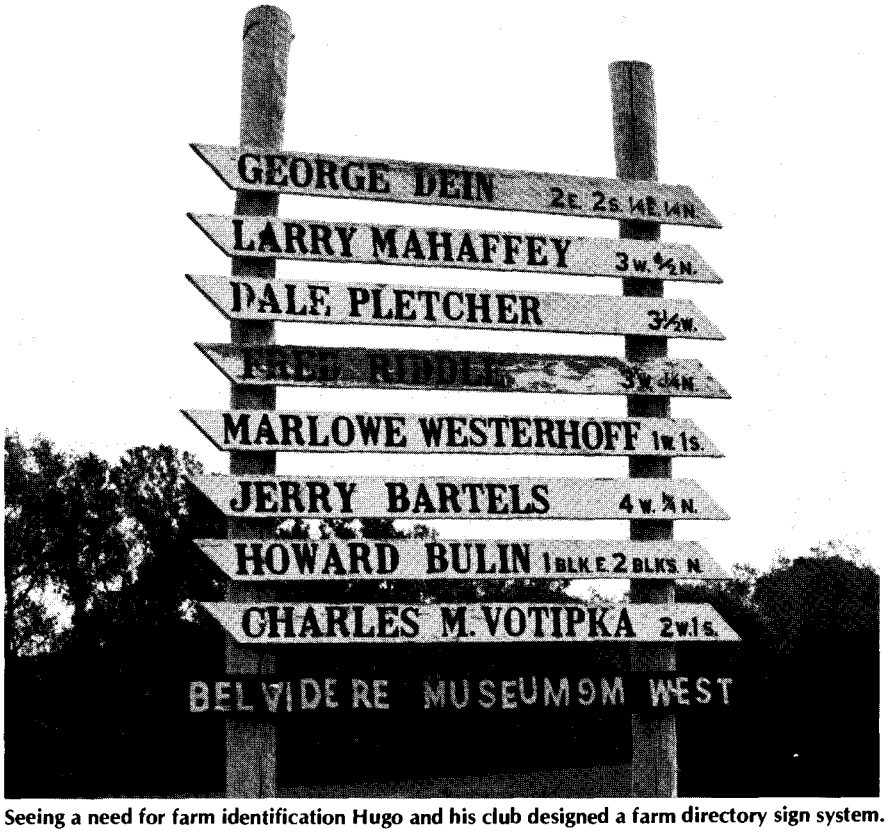
Community Development

Hugo's guidance led the Sandy Creek club into their present interest in community development.

One of the earliest projects came up after seeing a need for identifying and locating area farms. Hugo and the club designed a series of farm directory signs, placed at strategic points around the community, with the farmers' name and directions to the farm.

That took care of the farms, but the town of Alexandria needed identity also. The club then organized to put up proper street identification. Alexandria had street names but no street signs, so the club cut, painted and installed wooden corner posts with street names.

House numbers were the club's next project. Members cut, painted and sold house numbers to the community. This need for identification didn't stop there. The club



Seeing a need for farm identification Hugo and his club designed a farm directory sign system.

took the names and new addresses of Alexandria citizens to the local phone company. The Alexandria phone directory now lists it's residents by name and street address. This practice is unique in communities the size of Alexandria.

This year the club placed a businessman's directory at the Alexandria State Recreation Area, just east of town. Visitors to the lakes now know what businesses they can find in Alexandria.

Probably the most noticeable contribution the club and Hugo have made in Alexandria is the Community Club building.

Located on main street, the building was once a locker plant. The 4-H club, seeing a need for a community meeting place, organized a renovation project involving townspeople and 4-H members in refurbishing the building.

The club applied for and received grants from Ak-Sar-Ben and Reader's Digest to help fund the project. Hugo's personal contributions, aside from organizing the project, included donating the building, paneling, suspended ceiling and the furnace. Other contributors donated tables, kitchen and bathroom fixtures, carpeting and other furnishings. The hall is used for 4-H meetings and other community gatherings.

The Sandy Creek club, with the help of another Ak-Sar-Ben Community Pride Grant, organized and helped build a mini-park with picnic facilities, a drinking fountain, trees, flowers and a large mural, painted by the local high school art class.

Two other projects have also kept the club and Hugo busy. In cooperation with the local fire department, the club has offered Alexandria citizens a diabetes screening clinic and cardio-pulmonary resuscitation (CPR) training. Response to both programs was overwhelming.

Marv Sefrna attributes the success of the community development projects to Hugo and his club. "The club only has about 8 to 12 members and they get a lot accomplished for the size of the group. I would have to contribute the success of the projects to Hugo and the concerned leaders who work with him," he said. *(Continued on next page)*

Alexandria . . .

Dave Kerwood explained a 4-H'ers' view toward community development projects. "The 4-H members felt good and the response from the community was good. The projects created an identity for people in the community," he said.

Philosophy and 4-H

Hugo is slowing down a little but he has great deal of support from parents who help him in 4-H leadership. His record as a leader has proven itself and he's worked to be the best leader he can be. Hugo attended two National Leader Forums in Washington, D.C., a reunion of Forum delegates, and has taken 4-H'ers to State Club Week and State Fair more times than he can remember.

In his 30 years as a leader, Hugo hasn't had one club dropout. "Anyone who has started has finished," he said.

Hugo's own philosophy on 4-H reflects his 30-year devotion to the program. "Four-H has been a rewarding program. If you handle it right it gives kids a lot of help. Four-H puts kids up so they can go into the world," he said.

As a bachelor, 4-H is very important to Hugo. "A man once asked me how I could work with kids, without having any of my own. I told him I've got the biggest family in Thayer County," he said.

Hugo is very modest about his contributions and seeks nothing as repayment. "I've been repaid for everything I've put into it," he said. "I get a lot of satisfaction from working with kids."

A visitor to Alexandria might take for granted the street signs, house numbers, Community Club and farm directories, but the people in that community know the time, planning and effort that went into each project.

Community development projects, Hugo Broeder, and the Sandy Creek 4-H Club have helped make Alexandria more than a small town in Nebraska.□

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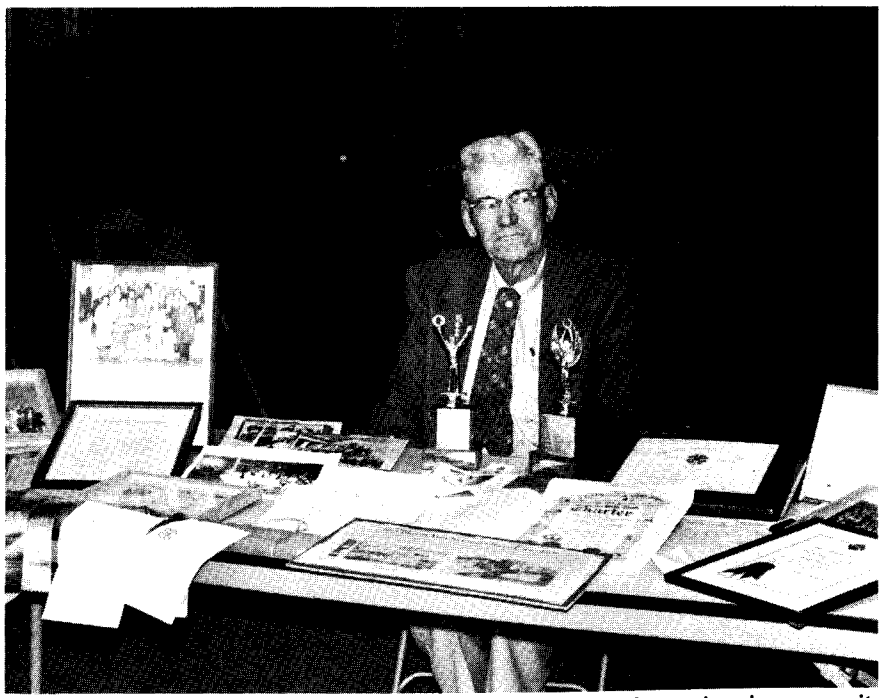

Hugo Broeder has 30 years of memorabilia as a 4-H leader and organizer in community development.